ELECTRICAL SPECIFICATIONS:

1. SCOPE OF WORK: PROVIDE SUPERVISION, LABOR, MATERIAL, EQUIPMENT, MACHINERY, PLANT AND OTHER ITEMS NECESSARY FOR A COMPLETE AND OPERABLE ELECTRICAL SYSTEM.

2. STANDARDS AND CODES: THE MATERIALS AND EQUIPMENT SHALL BE NEW AND LISTED BY UNDERWRITERS LABORATORIES, INC. THE INSTALLATION SHALL BE IN ACCORDANCE WITH THE 2012 VIRGINIA UNIFORM STATEWIDE BUILDING CODE (USBC); THE 2012 INTERNATIONAL BUILDING CODE (IBC) AS ADOPTED AND MODIFIED BY THE 2012 USBC; THE 2011 NFPA-70 (NATIONAL ELECTRICAL CODE, OR NEC); AND OTHER RELATED CODES AND STANDARDS. WORKMANSHIP SHALL MEET THE "STANDARDS OF INSTALLATION" AS PUBLISHED BY THE NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION (NECA).

3. PERMITS AND FEES: OBTAIN PERMITS, BONDS, LICENSES AND INSPECTION CERTIFICATES. PAY INSPECTION FEES AND TAXES. FILE PLANS AND PREPARE DOCUMENTS REQUIRED TO OBTAIN APPROVALS OF GOVERNMENTAL DEPARTMENTS HAVING JURISDICTION.

4. CONDUIT: PROVIDE RIGID GALVANIZED STEEL WHERE EXTERIOR ABOVE-GRADE. USE PVC JACKETED FLEXIBLE LIQUID-TIGHT CONDUIT TYPE UA FOR MOTOR CONNECTIONS. CONDUIT SHALL BE MINIMUM 3/4". SUPPORT CONDUIT AS REQUIRED BY THE NEC. FITTINGS SHALL NOT BE CAST POT METAL.

   TYPE AC, MC AND NMC CABLE ARE NOT ALLOWED.

5. JUNCTION, OUTLET AND PULL BOXES: PROVIDE JUNCTION, OUTLET AND PULL BOXES FOR WIRING DEVICES, FIXTURES, CONNECTIONS TO EQUIPMENT AND AS REQUIRED BY THE NEC. BOXES SHALL BE STEEL UNLESS REQUIRED OTHERWISE BY ENVIRONMENT (NEMA-3R WHERE EXTERIOR).

6. HANGERS AND SUPPORTS: PROVIDE ALL HANGERS, SUPPORTS, ANCHORS, SLEEVES AND SEALS AS REQUIRED BY THE NEC.

7. WIRING: PROVIDE COPPER CONDUCTORS, THHN OR THWN, 600 VOLT. WIRING SHALL BE COLOR-CODED TO IDENTIFY PHASES, NEUTRAL AND GROUND. MATCH EXISTING BUILDING WIRING COLOR-CODING. NUMBER 12 AWG SHALL BE THE SMALLEST SIZE WIRE USED FOR POWER. CONDUCTORS 8 AWG AND LARGER SHALL BE STRANDED; CONDUCTORS 10 AWG AND SMALLER SHALL BE SOLID. DO NOT INSTALL A SHARED NEUTRAL ON ANY CIRCUIT. ALL TERMINATIONS SHALL BE 75 DEGREES C.

8. GROUNDING: PROVIDE AN EQUIPMENT GROUNDING SYSTEM INSTALLED TO METALLIC STRUCTURES, ENCLOSURES, RACEWAYS, JUNCTION BOXES, OUTLET BOXES, PULL BOXES, CABINETS, MACHINE FRAMES, PORTABLE EQUIPMENT AND OTHER CONDUCTIVE ITEMS IN CLOSE PROXIMITY TO ELECTRICAL CIRCUITS. ALL BRANCH CIRCUITS SHALL INCLUDE A GREEN GROUNDING CONDUCTOR.

9. IDENTIFICATION: WHEREVER REASONABLY REQUIRED FOR SAFETY, MAINTENANCE AND/OR OPERATIONAL PURPOSES, PROVIDE SELF-ADHESIVE PLASTIC SIGNS FOR IDENTIFICATION, INSTRUCTION OR WARNING ON SWITCHES AND OUTLETS, AS WELL AS OTHER CONTROLS, DEVICES AND ENCLOSURE COVERS. PROVIDE A DANGER SIGN WHEREVER IT IS POSSIBLE FOR PERSONS TO COME INTO CONTACT WITH A VOLTAGE HIGHER THAN 120 VOLTS, AS WELL AS ON CRITICAL SWITCHES AND CONTROLS WHERE UNTIMELY OPERATION COULD BE A SAFETY HAZARD. PROVIDE AN ENGRAVED PLASTIC-LAMINATE LABEL ON EACH MAJOR UNIT OF ELECTRICAL EQUIPMENT, INCLUDING BUT NOT LIMITED TO: CONTROL PANELS, CABINETS, ENCLOSURES, VFD'S, DISCONNECT SWITCHES. EQUIPMENT LABELS SHALL INCLUDE WHAT IS REQUIRED IN NEC 408.4(B). ENCLOSURE TYPES SHALL BE MARKED PER NEC 110.28.

10. CONNECTIONS TO EQUIPMENT: MAKE FINAL ELECTRICAL POWER CONNECTIONS TO MECHANICAL EQUIPMENT. PROVIDE CONDUITS, OUTLET BOXES AND POWER WIRING FROM THE POWER SOURCE TO THE MOTOR OR EQUIPMENT JUNCTION BOX, INCLUDING WIRING THROUGH STARTERS OR SAFETY SWITCHES, IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.

11. SAFETY SWITCHES (SHOP DRAWINGS REQUIRED): PROVIDE SURFACE-MOUNTED, GENERAL-DUTY OR HEAVY-DUTY AS APPLICABLE. HORSEPOWER-RATED, FUSIBLE OR NON-FUSIBLE AS INDICATED, SAFETY SWITCHES WITH LUGS SUITABLE FOR COPPER OR ALUMINUM CONDUCTORS AND ELECTRO-SILVER PLATED CURRENT CARRYING PARTS, AND WITH EQUIPMENT GROUND BUS WITH APPROPRIATE LUGS. SWITCHES SHALL HAVE HINGED DOOR WITH DEFEATABLE INTERLOCK TO PREVENT DOOR FROM BEING OPENED IN "ON" POSITION; OPERATING LEVER ARRANGED FOR PADLOCKING IN THE "OFF" POSITION; ARC QUENCHERS; CAPACITY AND CHARACTERISTICS AS REQUIRED; NON-TEASABLE QUICK-MAKE AND QUICK-BREAK MECHANISM; DEAD FRONT; LINE SIDE SHIELD. PROVIDE A SET OF AUXILIARY CONTACTS FOR DISCONNECTS SERVING VFD'S, TO SEND A "DISABLE" SIGNAL TO THE VFD WHEN THE DISCONNECT IS OPENED.

    MANUFACTURER SHALL BE SQUARE D, GENERAL ELECTRIC, EATON OR SIEMENS.

12. CIRCUIT BREAKERS (SHOP DRAWINGS REQUIRED): WHERE NEW BREAKERS ARE INSTALLED IN EXISTING GEAR, PROVIDE ALL MOUNTING HARDWARE NEEDED. BREAKERS SHALL BE COMPATIBLE WITH EXISTING GEAR.

ELECTRICAL LEGEND

MTG. HGT.	SYMBOL	DESCRIPTION
	(1)	PLAN NOTE DESIGNATION.
EXISTING		208/120 VOLT PANELBOARD.
EXISTING		480/277 VOLT PANELBOARD.
5'-0" TO TOP	N/3/60	NON-FUSIBLE SAFETY SWITCH, WALL OR EQUIPMENT MOUNTED. NUMBER INDICATES NON-FUSED/3-POLE/60 AMP RATING.
	VFD	VARIABLE FREQUENCY DRIVE.

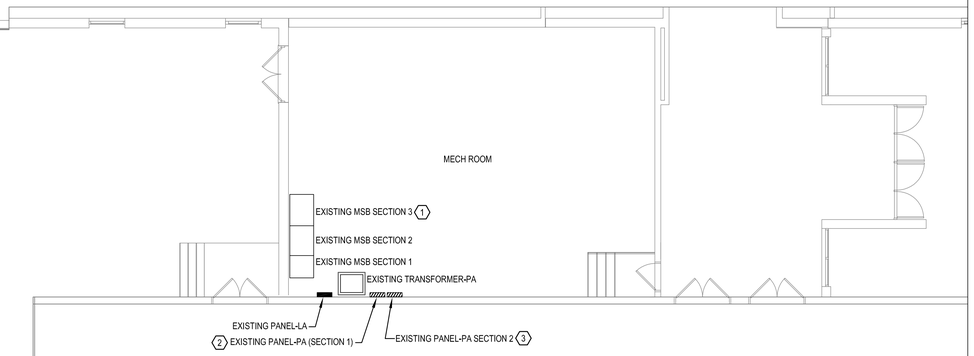
GENERAL NOTES:

1. CAREFULLY COORDINATE ALL ELECTRICAL EQUIPMENT LOCATIONS WITH DUCTWORK, PIPING AND MECHANICAL EQUIPMENT. MAINTAIN ALL CLEARANCES AND SPACES REQUIRED BY THE NEC.

2. WHERE MULTIPLE CIRCUITS ARE COMBINED IN A SINGLE CONDUIT, DERATE CONDUCTORS PER THE NEC.

3. MODIFY EXISTING PANEL SCHEDULES TO ACCURATELY REFLECT ALL CHANGES MADE AS PART OF THIS CONTRACT. ALL NEW BREAKERS IN EXISTING PANELS SHALL MATCH EXISTING AIC.

4. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMITTING BID IN ORDER TO VERIFY ALL EXISTING CONDITIONS, TO DETERMINE THE FULL EXTENT OF DEMOLITION WORK REQUIRED, AND TO DETERMINE THE FULL EXTENT OF RELOCATION AND MODIFICATION WORK REQUIRED FOR ELECTRICAL WORK (DUE TO OTHER DISCIPLINES INTERFERING OR ANY OTHER REASON). THE CONTRACTOR SHALL BE FULLY RESPONSIBLE TO COORDINATE ALL ELECTRICAL WORK WITH BOTH NEW AND EXISTING PIPING, CONDUIT, ETC. NO CHANGE ORDERS WILL BE APPROVED FOR ADDITIONAL WORK DUE TO THE CONTRACTOR NEGLECTING TO VISIT THE SITE AND GATHER ALL NECESSARY INFORMATION.



PLAN NOTES:⬡

1. REMOVE EXISTING 3-POLE 50-AMP BREAKER IN THIS SECTION FEEDING THE COOLING TOWER, AND REPLACE WITH NEW 3-POLE 60-AMP 50KAIC BREAKER. RECONNECT EXISTING CONDUCTORS. ALSO REPLACE EXISTING 3-POLE 40-AMP BREAKER IN THIS SECTION DIRECTLY ACROSS FROM THE COOLING TOWER BREAKER WITH NEW 3-POLE 40-AMP 50KAIC BREAKER (BREAKER FEEDS PANELS PF AND PG). SWITCHBOARD IS GE AV-LINE, 50KAIC, 480Y/277V 3-PHASE 4-WIRE 1600A STYLE 2 FOR THIS SECTION. NEW BREAKERS SHALL BE GE SPECTRA SERIES.

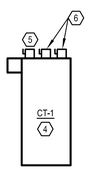
2. REMOVE EXISTING 3-POLE 20-AMP BREAKER IN THIS PANEL (SPACES 25,27,29) FEEDING THE COOLING TOWER BASIN HEATER, AND REPLACE WITH NEW 3-POLE 15-AMP 10KAIC BREAKER. RECONNECT EXISTING CONDUCTORS. PANELBOARD IS GE A-SERIES 208Y/120V 3-PHASE 4-WIRE 225A MCB.

3. EXISTING 1-POLE 20-AMP BREAKER IN THIS PANEL (SPACE 19) FEEDS THE COOLING TOWER HEAT TRACE.

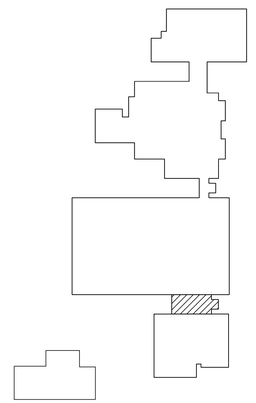
4. REMOVE EXISTING DISCONNECT SWITCHES SERVING COOLING TOWER FAN, BASIN HEATER AND HEAT TRACE. REMOVE ALL ABOVE-GRADE CONDUIT, BOXES, DISCONNECTS AND CONDUCTORS SERVING THE COOLING TOWER (UNDERGROUND CONDUIT AND CONDUCTORS WILL BE RE-USED FOR NEW TOWER).

5. NEW NEMA-3R N/3/60 FOR COOLING TOWER FAN (20HP 480V) ON THE SIDE OF THE COOLING TOWER PLATFORM. AT GROUND LEVEL, SET A NEW 16"x16" NEMA-3R SPLICE BOX TO CONNECT TO EXISTING CONDUCTORS (SET BOX ON TOP OF EXISTING CONDUIT JUST ABOVE GRADE). RUN NEW RIGID GALVANIZED STEEL CONDUIT WITH NEW CONDUCTORS (3 #4 AND 1 #4 GROUND TO MATCH EXISTING WIRING IN NEW 1" CONDUIT) FROM BOX UP TO NEW DISCONNECT, AND RUN NEW 3 #6 AND 1 #10 GROUND IN 1" LIQUID-TIGHT FLEXIBLE METAL CONDUIT FROM DISCONNECT TO FAN VIA THE FACTORY-PROVIDED CONTROLLER WITH VFD.

6. NEW NEMA-3R N/3/30 FOR COOLING TOWER BASIN HEATER (4KW 208V), AND NEW NEMA-3R N/1/30 FOR 120V HEAT TRACE, BOTH MOUNTED ON THE SIDE OF THE COOLING TOWER PLATFORM. AT GROUND LEVEL, SET A NEW 8"x8" NEMA-3R SPLICE BOX TO CONNECT TO EXISTING CONDUCTORS (SET BOX ON TOP OF EXISTING CONDUIT JUST ABOVE GRADE). RUN NEW RIGID GALVANIZED STEEL CONDUITS WITH NEW CONDUCTORS (3 #10 AND 1 #10 GROUND TO MATCH EXISTING BASIN HEATER WIRING IN NEW 3/4" CONDUIT, 2 #10 AND 1 #10 GROUND TO MATCH EXISTING HEAT TRACE WIRING IN NEW 3/4" CONDUIT) FROM BOX UP TO NEW DISCONNECTS. RUN NEW 3 #12 AND 1 #12 GROUND IN 3/4" LIQUID-TIGHT FLEXIBLE METAL CONDUIT FROM BASIN HEATER DISCONNECT TO HEATER VIA THE FACTORY-PROVIDED CONTROLLER, AND RUN NEW 2 #12 AND 1 #12 GROUND IN 3/4" LIQUID-TIGHT FLEXIBLE METAL CONDUIT FROM HEAT TRACE DISCONNECT TO HEAT TRACE.



ELECTRICAL PLAN
SCALE: 1/8" = 1'-0"



KEY PLAN
NO SCALE

LPA
LAWRENCE PERRY & ASSOCIATES
Consulting Engineers
15 E Salem Avenue SE, Suite 101
Roanoke, Virginia 24011
Ph: (540) 342-1616
Fax: (540) 344-3410

COMMONWEALTH OF VIRGINIA
04/22/16
RYAN W. HOLLOWAY
Lic. No. 048500
PROFESSIONAL ENGINEER

REVISION	DATE

D.G. COOLEY LOWER - COOLING TOWER REPLACEMENT
CLARKE COUNTY PUBLIC SCHOOLS
BERRYVILLE, VIRGINIA 22611

ELECTRICAL PLAN, LEGEND, NOTES AND SPECIFICATIONS

DESIGNED RWH	DRAWN RWH
CHECKED RWH	APPROVED LPA
COMM. NO. 16115.01	DATE 04-22-16

SHEET
E-1